

Applied Algebra: Homework assignment 12
Due date: December 13

Let the code function $f : B^3 \rightarrow B^7$ be given by the generating matrix

$$G = \begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 & 1 \end{pmatrix}.$$

1. Find the number of the codewords of f . Show that all nonzero codewords have weight 4.
2. How many errors does f detect and how many errors does it correct?
3. Find the parity-check matrix of f . Use it to write down the two-column decoding table for f .
4. Use this table to correct the message

1100011 1011000 0101110 0110001 1010110.

5. Let G be the group G_{20} (=the group of invertible congruence classes modulo 20). What, according to Lagrange theorem, are the *possible* orders of elements of G and which of these integers are *actually* orders of elements of G ?